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(54) **FOOT-DECK-BASED VEHICLE WITH INCREASED POTENTIAL ENERGY FOR OLLIE-TYPE MANOEUVERS**

(71) Applicant: **Sketchpad, Inc.**, Deerfield, IL (US)

(72) Inventor: **Benjamin Zachary Edelstein**, Deerfield, IL (US)

(73) Assignee: **SKETCHPAD, INC.**, Deerfield, IL (US)

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A63C 17/00	(2006.01)
A63C 17/01	(2006.01)

(52) **U.S. Cl.**

CPC ***A63C 17/0046*** (2013.01); ***A63C 17/01*** (2013.01); ***A63C 17/015*** (2013.01); *A63C 17/012* (2013.01); *A63C 2203/40* (2013.01); *A63C 2203/42* (2013.01)

(58) **Field of Classification Search**

CPC ... A63C 17/0046; A63C 17/01; A63C 17/017; A63C 17/26; A63C 2201/02; A63C 2203/20; A63C 2203/40; A63C 2203/42; F16F 1/041; F16F 1/145

See application file for complete search history.

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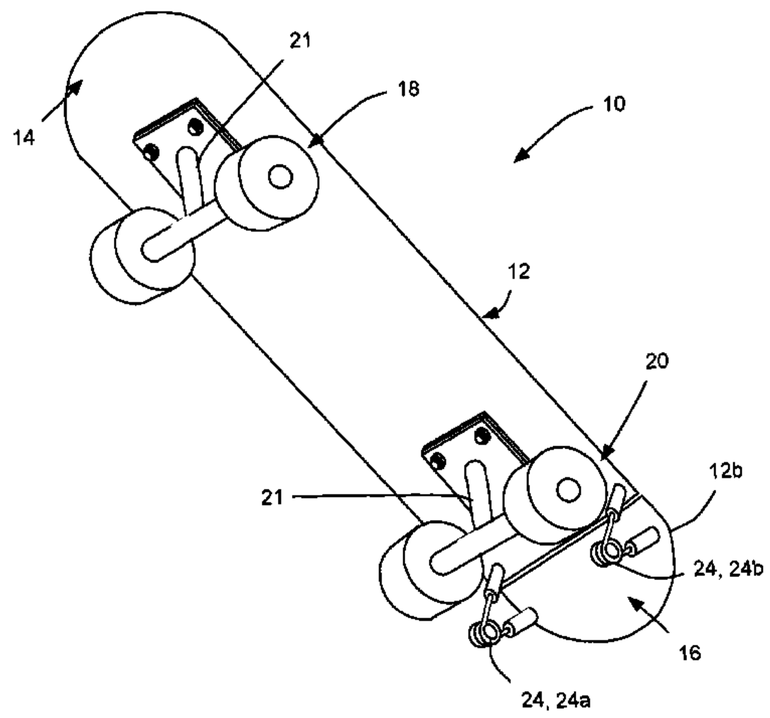
Primary Examiner — James A Shriver, II
Assistant Examiner — Steve Clemmons
(74) *Attorney, Agent, or Firm* — Millman IP Inc.

(57) **ABSTRACT**

In an aspect, a foot-deck based vehicle is provided, comprising a foot-deck, a front wheel arrangement, a rear wheel arrangement and a biasing member. The foot-deck has a front end and a rear end. The front wheel arrangement is proximate the front end. The rear wheel arrangement is proximate the rear end. The foot-deck has a first foot-deck portion and a second foot-deck portion that is rearward of the first foot-deck portion and that is movable relative to the first foot-deck portion. The second foot-deck portion extends rearward of the rear wheel arrangement. The biasing member biases the second foot-deck portion towards a home position relative to the first foot-deck portion. The second foot-deck portion is moveable from the home position downward to a biased position so as to store potential energy in the biasing member such that the biasing member urges the first foot-deck portion upward.

9 Claims, 4 Drawing Sheets



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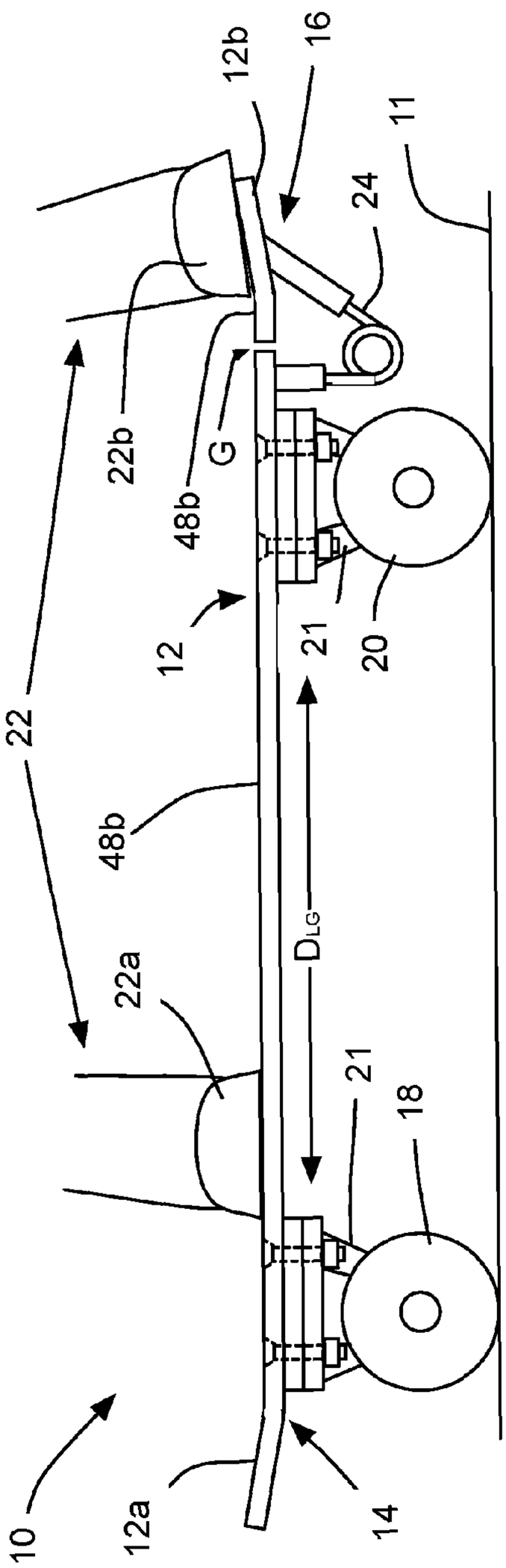
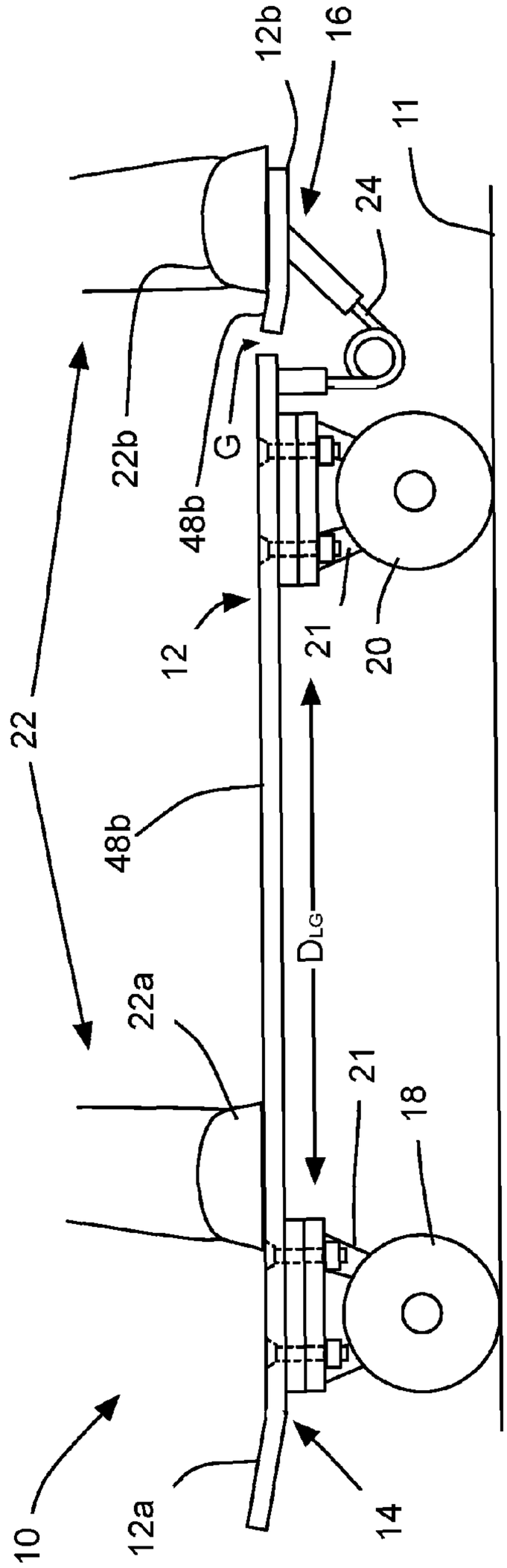

12b
16
11
24
22b
48b
G
12
21
20
22
48b
D_{LG}
22a
21
18
10
12a
14

FIG. 1


12b
16
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12a
14

FIG. 2

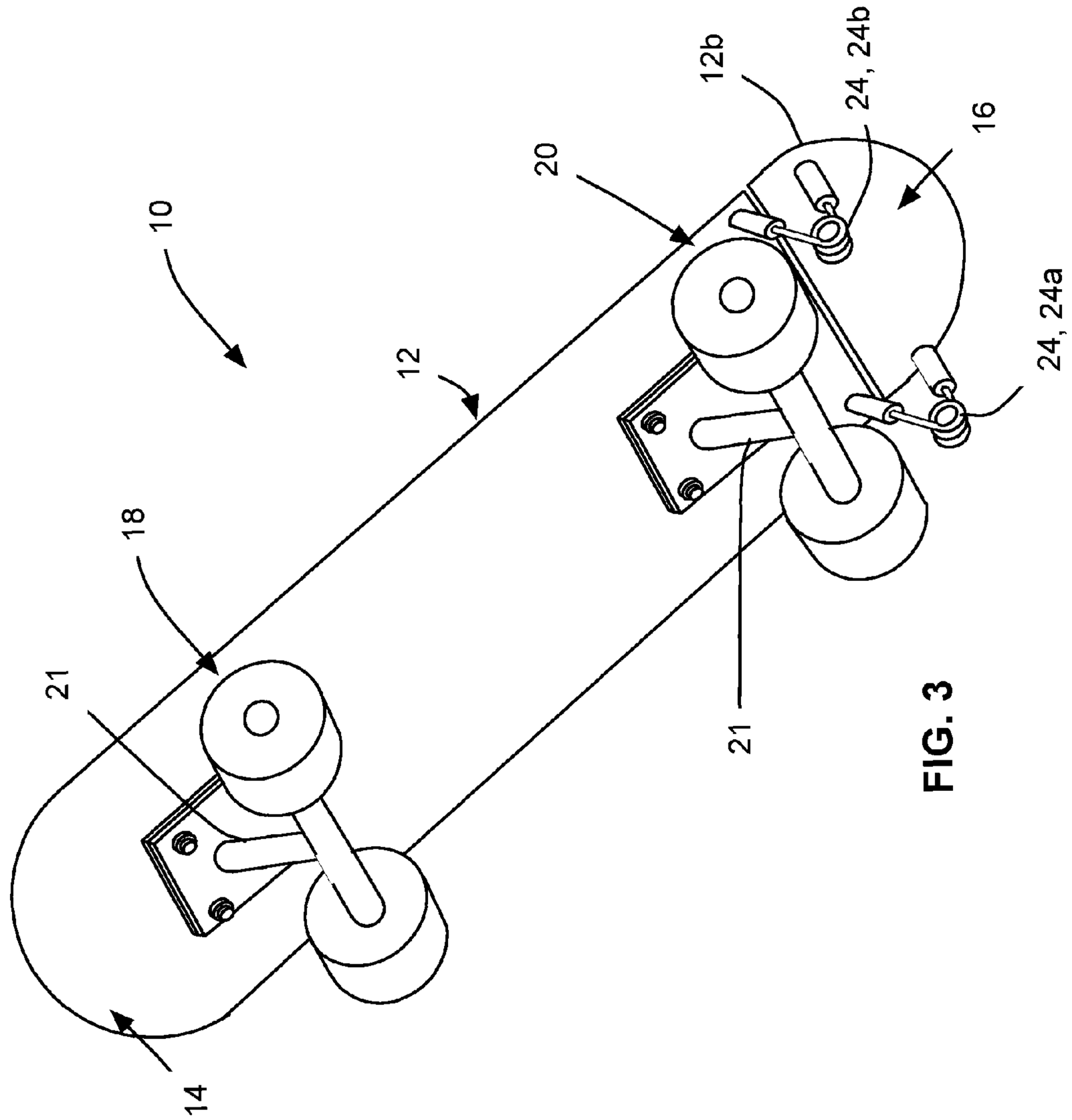

FIG. 3

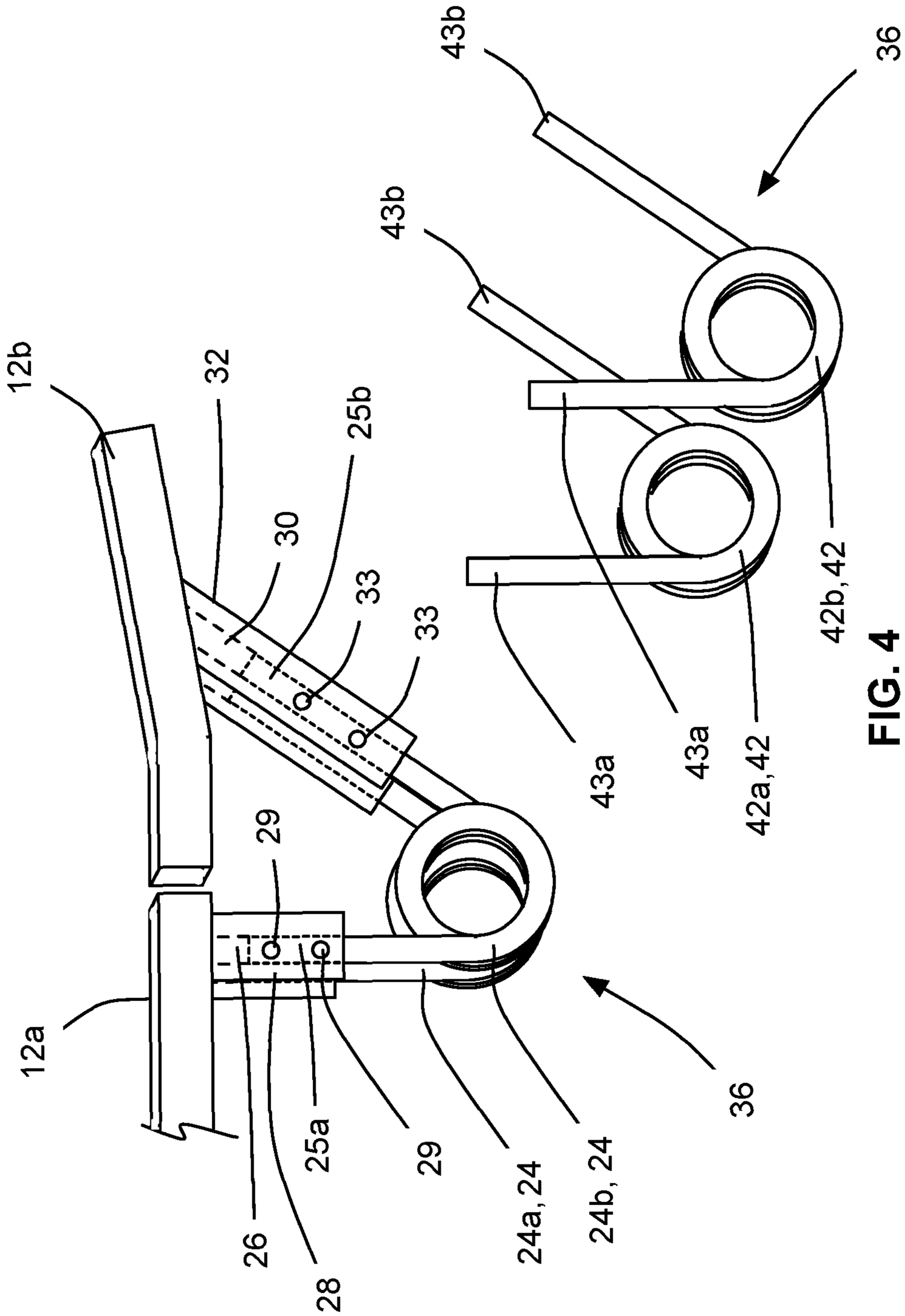
43b
36
43b
12b
32
30
25b
33
33
29
43a
43a
42a, 42
42b, 42
12a
26
28
25a
29
24a, 24
24b, 24
36

FIG. 4

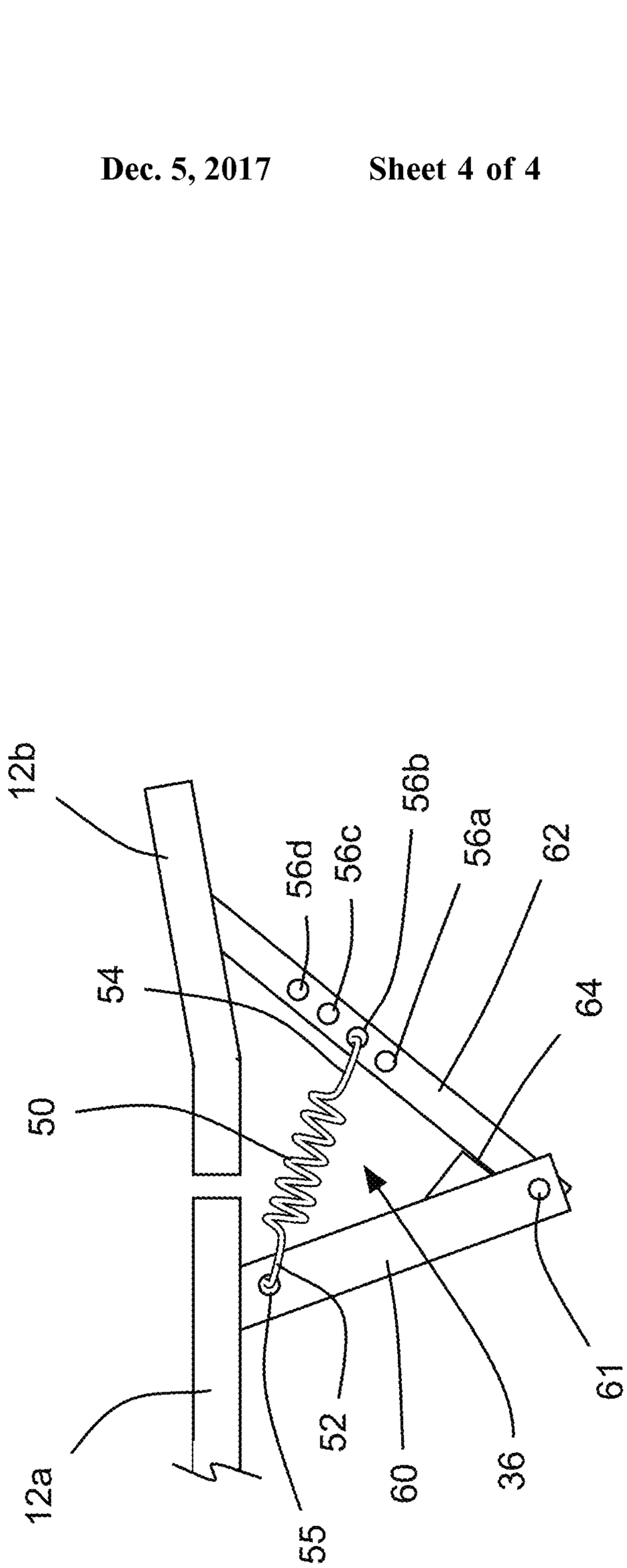

FIG. 5

FOOT-DECK-BASED VEHICLE WITH INCREASED POTENTIAL ENERGY FOR OLLIE-TYPE MANOEUVERS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Patent Application No. 62/115,977 filed Feb. 13, 2015, the contents of which are incorporated herein in their entirety.

FIELD

This disclosure relates generally to the art of foot-deck based vehicles and more particularly to skateboards.

BACKGROUND

In the art of skateboarding, many tricks that are performed incorporate some variant of an ollie-type manoeuver. The ollie is a manoeuver in which the rider leaps into the air with the skateboard, without the use of his/her hands to hold the skateboard. Generally speaking, the ollie is considered a relatively important trick to master for those who wish to perform advanced skateboarding manoeuvers, and is fundamental to many of those manoeuvers. It is also generally considered to be difficult to learn. An important aspect of learning to perform an ollie successfully is to be able to get the board high enough off the ground in order to pass over an obstacle. Getting increased height from the ground is beneficial in order to permit the rider to pass over relatively high obstacles. It also permits the rider to pass over relatively long obstacles, since increased height off the ground during a jump (i.e. during an ollie) can result in increased length of the jump. It is therefore beneficial to provide a skateboard or other foot-deck based vehicle that facilitates relatively higher ollies.

SUMMARY

In an aspect, a foot-deck based vehicle is provided, comprising a foot-deck, a front wheel arrangement, a rear wheel arrangement and at least one first biasing member. The foot-deck has a front end and a rear end. The front wheel arrangement is proximate the front end. The rear wheel arrangement is proximate the rear end. The foot-deck has a first foot-deck portion and a second foot-deck portion that is rearward of the first foot-deck portion and that is movable relative to the first loot-deck portion. The second foot-deck portion extends rearward of the rear wheel arrangement. The at least one first biasing member biases the second foot-deck portion towards a home position relative to the first foot-deck portion. The second foot-deck portion is moveable from the home position downward to a biased position so as to store potential energy in the at least one first biasing member such that the at least one first biasing member urges the first foot-deck portion upward.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other aspects of the invention will be better appreciated with reference to the attached drawings, wherein:

FIG. **1** is a side view of a foot-deck based vehicle, in a first position, in accordance with an embodiment of the disclosure;

FIG. **2** is a side view of the foot-deck based vehicle shown in FIG. **1**, in a second position;

FIG. **3** is a perspective view from underneath the foot-deck based vehicle shown in FIG. **1**;

FIG. **4** is a side perspective view showing a plurality of first biasing members that may be part of the foot-deck based vehicle in FIG. **1**, and a plurality of second biasing members that optionally are also included with the foot-deck based vehicle shown in FIG. **1**; and

FIG. **5** is a side view of an alternative biasing arrangement to that which is shown in FIGS. **1-4**.

DETAILED DESCRIPTION OF EXAMPLE EMBODIMENTS

FIG. **1** shows foot-deck-based vehicle **10** in accordance with an embodiment of the disclosure, on a ground surface **11**. The foot-deck-based vehicle **10** shown in the figures is a skateboard, however, it will be understood that any other suitable type of foot-deck-based vehicle may be provided, such as, for example, a kick scooter.

The foot-deck-based vehicle **10** may, for convenience, be referred to herein as a skateboard **10**. However, it is to be understood that it could be any other suitable foot-deck-based vehicle.

The skateboard **10** includes a foot-deck **12** that is elongate and has a front end **14** and a rear end **16**, and which defines a longitudinal direction D_{LG} for the skateboard **10**. The skateboard **10** further includes a front wheel arrangement **18** proximate the front end **12**, and a rear wheel arrangement **20** proximate the rear end **14**. The front and rear wheel arrangements **18** and **20** may be mounted to the foot-deck **12** in any suitable manner known in the art, such as by suitable first and second trucks **21** so as to permit a lean-to-steer functionality for the skateboard.

The foot-deck **12** has a first foot-deck portion **12***a* and a second foot-deck portion **12***b* that is rearward of the first foot-deck portion **12***a* and that is movable relative to the first foot-deck portion **12***a*. As can be seen in FIG. **1**, the second foot-deck portion **12***b* extends rearward of the rear wheel arrangement **20**. For greater clarity, it is not necessary for the entirety of the second foot-deck portion **12***b* to be rearward of the rear wheel arrangement **20**. It is only necessary that some portion of the second foot-deck portion **12***b* be positioned rearward of the rear wheel arrangement **20** in order to permit a rider **22** to press down on it so as to initiate an ollie-type manoeuvre, as described further below. A portion of the rider **22** (namely, the feet and lower portions of the legs) is shown at in FIGS. **1** and **2**.

The skateboard **10** further includes at least one first biasing member **24** that biases the second foot-deck portion **12***b* towards a home position (FIG. **1**) relative to the first foot-deck portion **12***a*. The second foot-deck portion **12***b* is moveable from the home position downward to a biased position (FIG. **2**) so as to store potential energy in the biasing member **24** such that the at least one first biasing member **24** urges the first foot-deck portion **12***a* upward.

In the example shown, the at least one first biasing member **24** includes first and second first biasing members **24***a* and **24***b* (FIG. **3**) that are spaced laterally from one another and that together make up a biasing arrangement **26**. Each first biasing member **24** is, in the example shown, a torsion spring and has a first end **25***a* that is releasably connectable to the first foot-deck portion **12***a* and a second end **25***b* that is releasably connectable to the second foot-deck portion **12***b*. In the example shown, the first end **25***a* is a first tang that is generally snugly received in a first end

receiving aperture **26** in a first tube **28** that forms part of the first foot-deck portion **12***a*. A plurality of first end set screws **29** (FIG. **4**) pass through the wall of the first tube **28** and capture the first end **25***a* locking it in the first end receiving aperture **26**. Similarly, the second end **25***b* is a second tang that is generally snugly received in a second end receiving aperture **30** in a second tube **32** that forms part of the second foot-deck portion **12***b*. A plurality of second end set screws **33** pass through the wall of the second tube **32** and capture the second end **25***b*, locking it in the second end receiving aperture **30**.

It will be noted that, in FIG. **4**, the second foot-deck portion **12***b* is shown as having the feature of being generally square at its rear end instead of having a rounded rear end as shown in FIG. **3**. Either configuration is contemplated.

As can be seen in FIG. **3**, in the example shown the biasing member **24** is part of a biasing arrangement **36** that includes two of the biasing member (i.e. first and second ones of the biasing member **24**) that each apply a biasing force between the first and second foot-deck portions **12***a* and **12***b*. The biasing forces applied by the biasing members in the biasing arrangement may all be the same, or alternatively they may be different for each biasing member. In FIG. **3**, the two ones of the biasing member are shown at **24***a* and **24***b* respectively. While two of the biasing member are shown in FIG. **3**, it will be understood that the biasing arrangement could alternatively have three or more ones of the biasing member **24**. In embodiments where more than one of the biasing member **24** is provided in the biasing arrangement, the biasing members **24** making up the biasing arrangement may all the substantially identical (as shown in FIG. **3**), or alternatively they may be different from one another.

With reference to FIG. **4**, the at least one first biasing member **24** (e.g. the first and second first biasing members **24***a* and **24***b*) has a first spring rate associated therewith. In some embodiments, the skateboard **10** further includes at least one second biasing member **42**. In the example shown in FIG. **4**, there are first and second, second biasing members shown at **42***a* and **42***b* respectively. Each of the second biasing members **42** has a first end **43***a* that is releasably connectable to the first foot-deck portion **12***a* and a second end **43***b* that is releasably connectable to the second foot-deck portion **12***b*. The at least one second biasing member **42** has a second spring rate that is different from the first spring rate. The at least one first biasing member **24** is removable from the first and second foot-deck portions **12***a* and **12***b* and is replaceable with the at least one second biasing member **42**.

The second spring rate may, for example, be selected to be lower than the first spring rate, such that the at least one first biasing member **24** may be usable by a first person who is relatively heavier, and the at least one second biasing member **42** may be usable by a second person who is relatively lighter, thereby making the skateboard **10** usable by riders covering a range of different weights.

The at least one second biasing member **42** may be dimensionally similar to the at least one first biasing member **24**, but may be made from a different material so as to have a different spring rate. Alternatively, the at least one second biasing member **42** may be dimensionally different than the at least one first biasing member **24**, and may thus be made from thicker or thinner material than the at least one first biasing member **24**, but the first and second ends **43***a* and **43***b* may be similar dimensionally to the first and second ends **25***a* and **25***b* so that they all fit similarly to one another in the receiving apertures **26** and **30**.

While first and second biasing members **24** and **42** are shown in the example embodiment in FIG. **4**, it will be understood that it is possible for the skateboard **10** to only include at least one first biasing member **24**.

In the embodiment shown in FIGS. **1-4**, it can be seen that the second foot-deck portion **12***b* is spaced from the first foot-deck portion **12***a* and is connected to the first foot-deck portion **12***a* only through the at least one biasing member **24** (or **42**). For example, a longitudinal gap (G) is shown on the foot-deck riding surface (i.e. the surface of the foot-deck that supports the rider **22**), between a first portion **48***a* and a second portion **48***b* (on the first and second foot-deck portions respectively **12***a* and **12***b*).

Alternatively, however, the second foot-deck portion **12***b* may be connected to the first foot-deck portion **12***a* via a suitable type of connection that permits the second foot-deck portion to travel between the home and biased positions as needed based on the force applied by the rider **22**.

With reference to FIG. **5**, another optional feature of the connection between the at least one first biasing member **24** and the first and second foot-deck portions **12***a* and **12***b*, is for the at least one first biasing member **24** to be adjustably connected to the foot-deck **12** in a plurality of positions, so as to adjust a force-deflection relationship for the second foot-deck portion **12***b*. This feature may be achieved in any suitable way. For example, in the embodiment shown in FIG. **5**, the at least one first biasing member includes at least one first helical tension spring **50**. Each of the first and second ends (shown at **52** and **54** respectively) of the tension spring **50** may include a hook, which are releasably received in first and second end receiving apertures **55** and **56** on the first and second foot-deck portions **12***a* and **12***b* respectively. On the second foot-deck portion **12***b* there are a plurality of end receiving apertures **56** (shown individually at **56***a*, **56***b*, **56***c* and **56***d*). As can be seen, the spring **50** will be stretched to a different length and will therefore have a different amount of preload in it depending on which of the apertures **56***a*-**56***d* that its second end **54** is hooked into. Thus, when the spring **50** is in the aperture **56***d*, the preload in the spring **50** will be higher and so the spring force urging the second foot-deck portion **12***b* to remain at the home position (shown in FIG. **5**) will be higher, than when the spring **50** is in the aperture **56***a*, for example. As a result, the aperture **56***d* may be used for instances when the rider **22** (FIG. **1**) is relatively heavier and the aperture **56***a* may be used for instances when the rider **22** is relatively lighter.

It will be noted that, in the embodiment shown in FIG. **5**, the second foot-deck portion is connected hingedly to the first foot-deck portion **12***a* by means of a first arm **60** on the first foot-deck portion **12***a* that is connected by a pin joint **61** to a second arm **62** on the second foot-deck portion **12***b*, while the spring **50** extends between the first and second arms **60** and **62**. While a single first arm **60** and a single second arm **62** may be provided, it is preferable that a first arm **60** is provided on each of the left and right sides of the first foot-deck portion **12***a* and a second arm **62** is provided at each of the left and right sides of the second foot-deck portion **12***b*. Providing two such first arms **60** and two such second arms **62** pivotally connected to the first arms **60** renders the connection between the first and second foot-deck portions **12***a* and **12***b* more resistant to twisting deformation and better constrains the movement of the second foot-deck portion **12***b* relative to the first foot-deck portion **12***a* to be in the vertical and longitudinal directions and not in the lateral direction.

In all the positions for the spring **50** (i.e. regardless of which hole **56** the second end **54** of the spring **50** is in), there

is some tension in the spring **50** and the spring **50** holds the second arm **62** in abutment with a limit surface **64** on the first arm **60**. This defines the home position for the second foot-deck portion **12***b*.

Constraint of the second foot-deck portion **12***b* from lateral movement relative to the first foot-deck portion **12***a* in the embodiment shown in FIGS. **1-4** may be achieved through the stiffness of the torsion springs **24** or **42** themselves.

It is optionally possible for the at least one biasing member **24** (or **42**, or **50**) to include a single biasing member. In such an embodiment, the biasing member **24**, or **42**, or **50** may be positioned generally along the longitudinal centerline of the skateboard **10**. Preferably, the second foot-deck portion **12***b* would, in all embodiments, be constrained sufficiently to substantially prevent substantially any lateral movement relative to the first foot-deck portion **12***a* during movement of the second foot-deck portion **12***b* between the home and biased positions. Thus, for example, the pin joints **61** between the first and second arms **60** and **62** may prevent any lateral play.

The rider **22** performs an ollie-type manoeuvre substantially as they would with a traditional skateboard. The rider **22** has a first foot **22***a* on the first foot-deck portion **12***a* and a second foot **22***b* on the second foot-deck portion **12***b*. When the rider **22** pushes down with the second foot **22***b* on the second foot-deck portion **12***b* to bring the second foot-deck portion **12***b* away from the home position to a biased position (FIG. **2**), while maintaining a portion of their weight on the first foot-deck portion **12***a* with their first foot **22***a*, potential energy is stored in the at least one biasing member **24** (or **42**, or **50**), such that the at least one biasing member **24**, **42** or **50** urges the first foot-deck portion **12***a* upward. The rider **22** jumps using the known technique for performing an ollie. Upon release of the rider's first foot **22***a* from the first foot-deck portion **12***a*, the at least one biasing member **24**, **42** or **50** releases its stored potential energy and drives the first foot-deck portion **12***a* upwards with greater energy than can be had with a similar skateboard that does not include the at least one biasing member **24**, **42** or **50**. This facilitates achieving a greater height above the ground surface **11** for the ollie-type manoeuvre.

While the description contained herein constitutes a plurality of embodiments of the present invention, it will be appreciated that the present invention is susceptible to further modification and change without departing from the fair meaning of the accompanying claims.

The invention claimed is:

1. A foot-deck based vehicle, comprising

a foot-deck having a front end and a rear end,

a front wheel arrangement proximate the front end, and a rear wheel arrangement proximate the rear end,

wherein the foot-deck has a first foot-deck portion and a second foot-deck portion that is rearward of the first foot-deck portion and that is movable relative to the first foot-deck portion, wherein the second foot-deck portion extends rearward of the rear wheel arrangement; and

at least one first biasing member that is adjustably connected to the foot-deck in one of a plurality of discrete positions so as to adjust a force-deflection relationship biasing the second foot-deck portion towards a home position relative to the first foot-deck portion, wherein the second foot-deck portion is moveable from the home position downward to a biased position so as to store potential energy in the at least one first biasing member such that the at least one first biasing member urges the first foot-deck portion upward.

2. A foot-deck based vehicle as claimed in claim **1**, wherein each first biasing member has a first end that is releasably connectable to the first foot-deck portion and a second end that is releasably connectable to the second foot-deck portion.

3. A foot-deck based vehicle as claimed in claim **2**, wherein the at least one first biasing member has a first spring rate and wherein the foot-deck based vehicle further comprises at least one second biasing member, each of which has a first end that is releasably connectable to the first foot-deck portion and a second end that is releasably connectable to the second foot-deck portion, and

wherein the at least one second biasing member has a second spring rate that is different from the first spring rate, wherein the at least one first biasing member is removable from the first and second foot-deck portions and is replaceable with the at least one second biasing member.

4. A foot-deck based vehicle as claimed in claim **1**, wherein the at least one biasing member includes a torsion spring.

5. A foot-deck based vehicle as claimed in claim **1**, wherein the at least one biasing member includes first and second first biasing members, wherein the first and second first biasing members are spaced apart laterally from one another.

6. A foot-deck based vehicle as claimed in claim **1**, wherein the second foot-deck portion is spaced from the first foot-deck portion in at least one of the home position and the biased position.

7. A foot-deck based vehicle as claimed in claim **1**, wherein the second foot-deck portion is spaced from the first foot deck portion in both the home position and the biased position.

8. A foot-deck based vehicle as claimed in claim **1**, wherein the second foot-deck portion is connected to the first foot-deck portion only through the biasing member.

9. A foot-deck based vehicle as claimed in claim **1**, wherein the foot-deck based vehicle is a skateboard.

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